

ABSTRACT

This invention is directed to making chemical derivatives of carbon nanotubes and to uses for the derivatized nanotubes, including making arrays as a basis for synthesis of carbon fibers. In one embodiment, this invention also provides a method for preparing single wall carbon nanotubes having substituents attached to the side wall of the nanotube by reacting single wall carbon nanotubes with fluorine gas and recovering fluorine derivatized carbon nanotubes, then reacting fluorine derivatized carbon nanotubes with a nucleophile. Some of the fluorine substituents are replaced by nucleophilic substitution. If desired, the remaining fluorine can be completely or partially eliminated to produce single wall carbon nanotubes having substituents attached to the side wall of the nanotube. The substituents will, of course, be dependent on the nucleophile, and preferred nucleophiles include alkyl lithium species such as methyl lithium. Alternatively, fluorine may be fully or partially removed from fluorine derivatized carbon nanotubes by reacting the fluorine derivatized carbon nanotubes with various amounts of hydrazine, substituted hydrazine or alkyl amine. The present invention also provides seed materials for growth of single wall carbon nanotubes comprising a plurality of single wall carbon nanotubes or short tubular molecules having a catalyst precursor moiety covalently bound or physisorbed on the outer surface of the sidewall to provide the optimum metal cluster size under conditions that result in migration of the metal moiety to the tube end.